

## ABSTRACT OF THE DISCLOSURE

An on-chip interferometric backscatter detector (OCIBD) makes use of plastic substrates in which a rectangular sample channel is formed. While any plastic material can be used to form the channel substrate, the substrate is most preferably formed from polydimethylsiloxane (PDMS). An incident laser beam reflects off of the sample channel walls and through the sample in the channel, thereby generating backscattered reflections that create interference fringe patterns. The fringe patterns are detected by a photodetector and used to determine various properties of the sample. To provide the best results, the laser beam diameter should be no smaller than the channel width so that the entire channel will be illuminated by the beam, and preferably should be slightly, e.g., 5%, larger. This will insure that the laser light reflected off of the walls of the channel will generate the desired interference fringe patterns, despite the less than optimum rectangular geometry of the channel walls. A reference channel can be provided to improve the accuracy of the measurements made with the detector. One notable application of the invention is the analysis of binding experiments on biochemical functional species, such as proteins and DNA.